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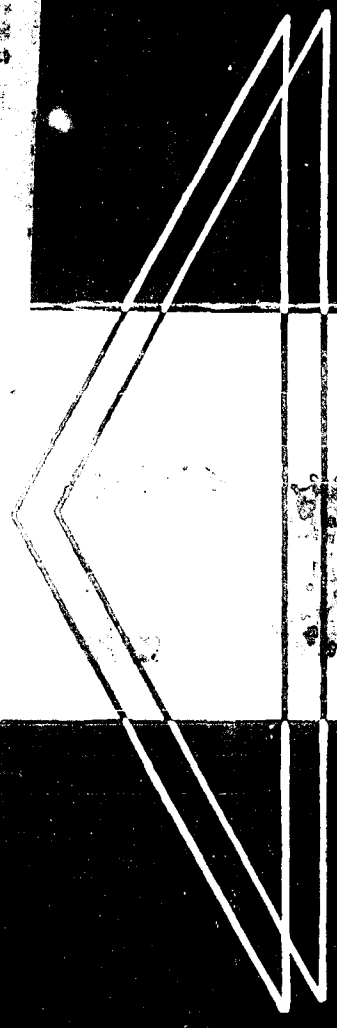

DUCTED PROPELLER ASSAULT TRANSPORT

PROGRESS REPORT NO. 10

Report No. D181-981-010

15 APRIL 1956

BELL Aircraft CORP.

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BELL Aircraft CORPORATION
BUFFALO 5, NEW YORK

TECHNICAL DATA

REPORT NO. D181-981-010

DUCTED PROPELLER
ASSAULT TRANSPORT STUDY
PROGRESS REPORT NO.10
(Period 1 March to 31 March 1956)

DATE 15 April 1956

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I. SUMMARY

On 1 May 1955 the Bell Aircraft Corporation initiated work on a study for the Office of Naval Research, Department of the Navy to investigate ducted propeller propulsion systems for application to the design of an assault transport aircraft. This work was undertaken in advance of the contract which was received by Bell Aircraft on 5 July 1955 (Contract Nonr-1675(00). This report reviews the progress accomplished in the work period 1 March to 31 March 1956 and describes the current lines of investigation.

II. INTRODUCTION

The Bell Aircraft Corporation has undertaken a study for the Office of Naval Research, Department of the Navy, to investigate and evaluate the application of a ducted propeller propulsion system to the design of an assault transport aircraft. The missions for this type of aircraft are such that a vertical take-off and landing capability can be exploited to good advantage in operational situations. It is expected that this study will result in the determination of assault transport designs which satisfy the requirements of such aircraft.

As presently conceived, the study is being conducted in two general areas of work:

1. Theoretical development of propeller and duct design.
2. Configuration studies utilizing the knowledge from the theoretical analyses to develop practical propulsion system and aircraft arrangements.

The theoretical studies include several tasks:

1. Collection of the available background information on ducted propeller theory, design and experiment.
2. Systematic investigation of the various parameters which influence the ducted propeller performance to determine the best operating range for the assault transport application.
3. Detailed analyses of propellers and shrouds to determine a combination suitable for incorporation into the aircraft configuration studies.

4. Conduct performance and stability and control analyses on the aircraft configuration chosen.

The configuration studies or design work will also consist of several tasks:

1. Determination of practical systems of power transmission from the engines to the propellers.
2. Conduct introductory studies of assault transport configurations utilizing the results of the propulsion system study.
3. Accomplish a brief preliminary design of a promising configuration of an assault transport capable of meeting the requirements designated for the study.

In addition to the technical work outlined above, it was recommended that experimental verification of the results of the theoretical analysis be obtained. A wind tunnel testing program of selected propeller-ducted configurations would be a great aid in the determination of a practical propulsion system.

III. STATUS OF WORK

A. Aerodynamics and Configuration Studies

The technical studies have been concluded during the report period and the planning and execution of the work on the final reports has begun. The scheduled delivery date for the final reports is 15 May 1956. The series is listed below:

Summary Report	D181-945-001
Design Report	D181-945-002
Summary of the State of the Art	D181-945-003
Performance	D181-945-004
Stability and Control	D181-945-005
Duct and Propeller Analysis	D181-945-006
Preliminary Structural Anal.	D181-945-007
Standard Aircraft Characteristics	D181-945-008

The presentation of the results of the study will be made on 1 May 1956 at a joint session of all the study contractors.

B. Wind Tunnel Program.

During the month of March, fabrication of the parts for the first wind tunnel model were completed and final assembly of the test rig was well advanced. Changes in the stator blades and inlet vane materials

were made as recommended by the results of stress checks performed at Bell. Arrangements were completed for the transport of the necessary items of instrumentation for the tests from Bell Aircraft to the University of Wichita. The start of the wind tunnel test period was rescheduled for April 23, 1956.

IV. FUNDS AND MANHOURS EXPENDED

The funds and manhours expended since the initiation of work on the Ducted Propeller Assault Transport Study are shown below. As of 31 March 1956 the manhours expended represent approximately 93.8% of the total and the funds expended total about 88.0% of the projected total.